

SNC2D – Ionic Compounds: Formula to Name

Often, creating the name of a chemical from its formula is easy.

For most molecules, you can simply look up the name of each ion and put them together:

NaCl ↙ ↘ sodium chloride sodium chloride	Ca(OH)_2 ↙ ↘ calcium hydroxide calcium hydroxide	$\text{Mg}_3(\text{PO}_4)_2$ ↙ ↘ magnesium phosphate magnesium phosphate
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But, for a select few ions (copper, iron, lead, tin, cobalt, and others not listed in your chart), you will have to figure out what the original charge on the ion was.

For example, both of these ions were made out of copper and oxygen:



One contains copper (I) ions and the other contains copper (II) ions. Which is which?

Well, copper (I) plus oxygen makes $\text{Cu}^+ \quad \text{O}^{2-} \longrightarrow \text{Cu}_2\text{O}$
 and copper (II) plus oxygen makes $\text{Cu}^{2+} \quad \text{O}^{2-} \longrightarrow \text{Cu}_2\text{O}_2 \longrightarrow \text{CuO}$

You will have to do this test each time you see an element that can have more than one charge.

Try to create the name of each of the following:

- Na_3N
- RbF
- BeS
- ScP
- AlH_3
- KCl
- $\text{Cu}(\text{NO}_3)_2$
- $\text{Zn}_3(\text{PO}_4)_2$
- $\text{Fe}(\text{CN})_2$
- PbBr_4
- NH_4ClO_3
- CoF_3
- NaHCO_3
- $\text{Mg}(\text{SCN})_2$
- $\text{Cu}_2\text{Cr}_2\text{O}_7$
- $\text{Fe}(\text{MnO}_4)_3$
- KOH
- NaCH_3COO
- $\text{Co}(\text{NO}_3)_2$
- $(\text{NH}_4)_2\text{SO}_4$
- CuS

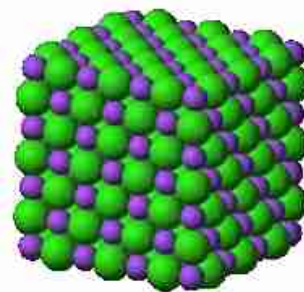
SNC2D – Properties of Ionic Compounds

All ionic compounds are **crystals**.

- There is never a single Na attached to a single Cl. There are a billion of each in an alternating arrangement.

Ionic compounds are very hard and very brittle

- Picture chipping away at a block of salt



Ionic compounds tend to have high melting and boiling points.

- This is because the positive ions and negative ions don't separate willingly

They are strong **electrolytes**. In solid state they do not conduct electricity, but in molten state and in aqueous solution they **do** conduct electricity.

From Wikipedia: an **electrolyte** is any substance containing free ions that make the substance electrically conductive. The most typical electrolyte is an ionic solution, but molten electrolytes and solid electrolytes are also possible.

Properties	
Molecular formula	NaCl
Molar mass	58.44 g mol ⁻¹
Exact mass	57.958622382 g mol ⁻¹
Appearance	Colorless crystals
Odor	Odorless
Density	2.165 g cm ⁻³
Melting point	801 °C, 1074 K, 1474 °F
Boiling point	1413 °C, 1686 K, 2575 °F
Solubility in water	359 g L ⁻¹

Ionic compounds are very soluble in water.

- Water is one of a group of substances that can separate the ions from each other. A group of water molecules surrounds the ions on the outer
- See the picture on the right...water carries individual ions away from the crystal, eating it away



Ionic compounds are usually formed when metal cations bond with nonmetal anions.

- All of the ionic compounds we've seen are **metal + non-metal**, except for ones with NH_4^+ which don't have any metal in them.